Claims

1. The electrochemical cells modules made up of couples of catalytic multilayer porous electrodes forming the anodes and the cathodes and delimitating external gaseous areas and internal areas containing the electrolyte and connected by an external electric circuit characterized in that
   - pressure modulators generating two pressure cycles independently synchronized but of opposite phase act at the inlet and at the outlet of the electrolyte and
   - the multilayer porous electrodes are weeping on the gas side.
2. The electrochemical cell according to claim 1 wherein
   - the multilayer porous electrodes are conductive and hydrophobic on the gas side,
   - the conductive and catalytic middle layers are hydrophobic and hydrophilic, and
   - a hydrophilic, non-conductive and non-catalytic layer is on the electrolyte side.
3. The electrochemical cell according to claims 1 and 2 wherein the pressure modulators are made by two tanks containing in use the electrolyte at two different pressures and each connected respectively at the inlet and at the outlet of the cell by a valve.
4. The electrochemical cell according to claim 3 wherein the opening section of the outlet valve S and of the inlet valve s are such that S>s.
5. The electrochemical cell according to claims 1 to 4 wherein an energy source provides an external continuous current to the porous electrodes such that at the negative electrode there is H_2 formation and at the positive electrode there is O_2 formation and the electrolyte is an aqueous solution of KOH.
6. The electrochemical cell according to claims 1 to 4 wherein the electrolyte is an aqueous solution of KOH, electric energy is drawn from the porous electrodes by feeding the gas sides of the electrodes with respectively H_2 and O_2.
7. The electrochemical cell according to claim 5 or 6 wherein means are provided to exchange heat in the anodes and cathodes through the electrolyte flowing into the electrochemical cell.
8. Electrochemical process utilizing the electrochemical cells of claims1 to 4

comprising the following steps:

- Maintaining on the gas side a pressure P up to 200 bar;
- Varying at the internal side discontinuously the electrolyte pressure in the range P+dP and P+dp
- Generating onto the electrolyte pressure positive waves of amplitude dP and dp with the frequency f : when one valve is open the other is closed and viceversa.

9. Electrochemical process according to claim 8 wherein the overpressure is such that $dP > dp$.
10. Electrochemical process according to claim 9 wherein the two overpressures are applied for cycles of length τ_P and τ_p where $\tau_P < \tau_p$ at the frequency $f = 1/T$ where $T = \tau_P + \tau_p$.
11. Electrochemical process according to claims 8 to 10 wherein an energy source provides an external continuous current to the porous electrodes such that at the negative electrode there is H_2 formation and at the positive electrode there is O_2 formation and the electrolyte is an aqueous solution of KOH.
12. The electrochemical process according to claims 8 to 10 wherein the electrolyte is an aqueous solution of KOH and electric energy is drawn from the porous electrodes by feeding the gas sides of the electrodes with respectively H_2 and O_2.
13. The electrochemical process according to claim 11 or 12 wherein heat is exchanged in the anodes and cathodes through the electrolyte flowing into the electrochemical cell.